

CLAIMS

1. An isolated xyloglucanase enzyme belonging to family 44 of glycosyl hydrolases, which exhibits a relative xyloglucanase activity of at least 30% between pH 5 and 8.
2. The xyloglucanase enzyme of claim 1, which is obtained from a microorganism.
3. The xyloglucanase enzyme of claim 2, which is obtained from a fungus
4. The xyloglucanase enzyme of claim 3, which is obtained from yeast.
5. The xyloglucanase enzyme of claim 2, which is obtained from a bacterium.
6. The xyloglucanase enzyme of claim 5, which is obtained from a gram-positive bacterium.
7. The xyloglucanase enzyme of claim 6, which is obtained from the *Bacillus/Lactobacillus* subdivision.
8. The xyloglucanase enzyme of claim 7, which is obtained from a species of *Paenibacillus*.
9. The xyloglucanase enzyme of claim 8, which is obtained from *Paenibacillus polymyxa*.
10. The xyloglucanase enzyme of claim 9, which is obtained from *Paenibacillus polymyxa*, ATCC 832.
11. The xyloglucanase enzyme of claim 8, which is obtained from *Paenibacillus sp.*, DSM 13329.

12. An isolated family 44 xyloglucanase, which is
(a) a polypeptide encoded by the DNA sequence of positions
121-1677 of SEQ ID NO: 1;

5 (b) a polypeptide produced by culturing a cell comprising
the sequence of SEQ ID NO: 1 under conditions wherein the DNA
sequence is expressed;

(c) a polypeptide encoded by a DNA sequence that hybridizes
to the DNA sequence of SEQ ID NO: 1 under medium stringency
10 conditions, wherein the medium stringency conditions are defined
as hybridization in 5xSSC at 45°C and washing in 2xSSC at 60°C;
or

(d) a polypeptide encoded by the xyloglucanase encoding part
of the DNA sequence obtained from the plasmid in *Escherichia coli*

15 DSM 13321.

13. The xyloglucanase of claim 12, which is obtained from a
bacterium.

20 14. The xyloglucanase of claim 13, which is obtained from a
gram-positive bacterium.

15. The xyloglucanase of claim 14, which is obtained from the
Bacillus/Lactobacillus subdivision.

25 16. The xyloglucanase of claim 15, which is obtained from a
species of *Paenibacillus*.

17. The xyloglucanase of claim 16, which is obtained from
30 *Paenibacillus polymyxa*.

18. The xyloglucanase of claim 17, which is obtained from
Paenibacillus polymyxa, ATCC 832.

35 19. The family 44 xyloglucanase of claim 12, which is

(a) a polypeptide encoded by the DNA sequence of positions 121-1677 of SEQ ID NO: 3;

(b) a polypeptide produced by culturing a cell comprising the sequence of SEQ ID NO: 3 under conditions wherein the DNA
5 sequence is expressed;

(c) a polypeptide encoded by a DNA sequence that hybridizes to the DNA sequence of positions 121-1677 of SEQ ID NO: 3 under medium stringency conditions, wherein the medium stringency conditions comprise hybridization in 5xSSC at 45°C and washing in
10 2xSSC at 60°C; or

(d) a polypeptide encoded by the xyloglucanase encoding part of the DNA sequence obtained from the plasmid in *Escherichia coli* DSM 13322.

15 20. The xyloglucanase of claim 12, which is:

(a) a polypeptide encoded by the DNA sequence of positions 121-1677 of SEQ ID NO: 5;

(b) a polypeptide produced by culturing a cell comprising the sequence of SEQ ID NO: 5 under conditions wherein the DNA
20 sequence is expressed;

(c) a polypeptide encoded by a DNA sequence that hybridizes to the DNA sequence of positions 121-1677 of SEQ ID NO: 5 under medium stringency conditions, wherein the medium stringency conditions comprise hybridization in 5xSSC at 45°C and washing in
25 2xSSC at 60°C; or

(d) a polypeptide encoded by the xyloglucanase encoding part of the DNA sequence obtained from the plasmid in *Escherichia coli* DSM 13323.

30 21. An isolated xyloglucanase enzyme, which is (i) free from homologous impurities, and (ii) produced by culturing a cell comprising the DNA sequence of positions 121-1677 of SEQ ID NO: 1, 3 or 5.

22. An enzyme preparation comprising the xyloglucanase enzyme of claim 1 and conventional fillers.

23. The preparation of claim 22 which further comprises one or more enzymes selected from the group consisting of proteases, cellulases, β -glucanases, hemicellulases, lipases, peroxidases, laccases, α -amylases, glucoamylases, cutinases, pectinases, reductases, oxidases, phenoloxidases, ligninases, pullulanases, pectate lyases, xyloglucanases, xylanases, pectin acetyl esterases, polygalacturonases, rhamnogalacturonases, pectin lyases, other mannanases, pectin methylesterases, cellobiohydrolases, transglutaminases; and mixtures thereof.

24. An isolated polynucleotide molecule encoding a polypeptide having xyloglucanase activity which polynucleotide molecule hybridizes to a denatured double-stranded DNA probe under medium stringency conditions, wherein the probe is selected from the group consisting of DNA probes comprising the sequence shown in positions 121-1677 of SEQ ID NO: 1, 3 or 5, and DNA probes comprising a subsequence of positions 121-1677 of SEQ ID NO: 1, 3 or 5, the subsequence having a length of at least about 100 base pairs.

25. An expression vector comprising the following operably linked elements: a transcription promoter; a DNA segment selected from the group consisting of (a) polynucleotide molecules encoding a polypeptide having xyloglucanase activity comprising a nucleotide sequence as shown in SEQ ID NO: 1, 3 or 5 from nucleotide 121 to nucleotide 1677, (b) polynucleotide molecules encoding a polypeptide having xyloglucanase activity that is at least 60% identical to the amino acid sequence of SEQ ID NO: 2 from amino acid residue 40 to amino acid residue 559, and (c) degenerate nucleotide sequences of (a) or (b); and a transcription terminator.

26. A cultured cell into which has been introduced an expression vector of claim 25, wherein said cell expresses the polypeptide.

27. A method of producing a polypeptide having xyloglucanase activity, which method comprises culturing a cell into which has been introduced an expression vector of claim 16, whereby said cell expresses a polypeptide encoded by the DNA segment; and recovering the polypeptide.

28. A detergent composition comprising the xyloglucanase enzyme of claim 1 and a surfactant.

29. A process for washing a fabric, comprising treating the fabric during a washing cycle of a machine washing process with a washing solution which comprises the xyloglucanase enzyme of claim 1.

30. Use of the xyloglucanase enzyme of claim 1 in the textile industry for improving the properties of cellulosic fibers, yarn, woven or non-woven fabric.

31. The use of claim 21, wherein the enzyme preparation or the enzyme is used in a textile scouring process step.

32. Use of the xyloglucanase enzyme of claim 1 in the cellulose fiber processing industry for ratting of fibers selected from the group consisting of hemp, jute, flax and linen.

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